Flight Delay Prediction

This project predicts whether a flight will be delayed based on various features such as the departure date, airport information, and passenger details. The model is built using a neural network implemented in TensorFlow.

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Overview

Flight delays are a common inconvenience for passengers and can have significant operational implications for airlines. This project aims to predict whether a flight will be delayed using a machine learning model. The model is trained on various features, including the departure date, airport details, and passenger information.

Dataset

The dataset used for this project includes the following features:

- Passenger ID
- First Name
- Last Name
- Gender
- Age
- Nationality
- Airport Name
- Airport Country Code
- Country Name
- Airport Continent
- Continents

- Departure Date
- Arrival Airport
- Pilot Name
- Flight Status (Target Variable: On Time/Delayed)

Source

The dataset is included in the repository as `Airline Dataset.csv`.

Preprocessing

The data preprocessing steps include:

1. **Date Conversion**: Converting `Departure Date` to a datetime object and extracting features like month, day, and day of the week.
2. **Label Encoding**: Encoding categorical variables such as `Gender`, `Nationality`, `Airport Name`, etc., into numerical values.
3. **Feature Scaling**: Scaling numerical features using `StandardScaler`.

Model

The model is a neural network built using TensorFlow. It consists of:

- Input Layer: 11 features
- Two Hidden Layers: Fully connected layers with ReLU activation and dropout for regularization
- Output Layer: A single neuron with sigmoid activation for binary classification (On Time/Delayed)

Training

The model is trained on 80% of the data and tested on the remaining 20%. It is compiled using the Adam optimizer and binary cross-entropy loss.

Installation

To run this project locally, follow these steps:

Clone the repository:

```
git clone https://github.com/yourusername/flight-delay-prediction.git
```

1. Navigate to the project directory:bash

   ```
   cd flight-delay-prediction
   ```
2. Install the required packages:

   ```
   pip install -r requirements.txt
   ```
3. Install the required packages:

   ```
   pip install -r requirements.txt
   ```

Usage

1. **Training the Model**: Run the Jupyter notebook `Flight delay Prediction.ipynb` to preprocess the data, train the model, and evaluate its performance.
2. **Making Predictions**: After training, you can use the trained model to make predictions on new data by providing features such as `Gender`, `Age`, `Nationality`, `Departure Date`, etc.
3. **Saving the Model**: The trained model can be saved and loaded for later use.

Results

The model's performance is evaluated using accuracy on the test set. The final accuracy can be improved by fine-tuning the model or using different machine learning techniques.

Contributing

Contributions are welcome! Please fork the repository and submit a pull request for any feature requests, bug fixes, or improvements.

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